

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claim 1 (Previously Presented): An endoscope system comprising:

an endoscope having a solid-state imaging device whose sensitivity can be varied by providing a plurality of pulsating driving signals so as to change an electron multiplication rate;

a signal processing unit for processing a signal output from said solid-state imaging device;

a light source unit for irradiating light to an object so that an object image will be projected on said solid-state imaging device;

switch means for causing transmission of excitation light from said light source unit to an object at spectral frequencies enabling object image observation at one of visible wavelengths or fluorescent wavelengths; and

a sensitivity control means for varying a sensitivity control pulse, applying it to said solid-state imaging device, and thus controlling the electron multiplication rate for said solid-state imaging device according to object image observation wavelength.

Claim 2 (Currently Amended): An endoscope system as claimed in Claim 1, wherein said comprising:

~~an endoscope having a solid-state imaging device whose sensitivity can be varied by providing a plurality of pulsating driving signals so as to change an electron multiplication rate;~~

~~a signal processing unit for processing a signal output from said solid-state imaging device;~~

~~a light source unit for irradiating irradiates light at spectral frequencies corresponding to white light or special light of wavelengths falling within a specified wavelength band to an object with the intensity of light varied;~~

~~a said switch means for switching observation under the white light or observation in an ordinary light mode and observation under the special light of wavelengths falling within the specified wavelength band or observation in a special light mode; and~~

~~a sensitivity control means for varying a sensitivity control pulse, applying it to said solid-state imaging device, and thus controlling the electron multiplication rate for said solid-state imaging device.~~

Claim 3 (Currently Amended): An endoscope system as claimed in Claim 1, wherein said comprising:

~~an endoscope having a solid-state imaging device whose sensitivity can be varied by applying a plurality of pulsating driving signals so as to change an electron multiplication rate;~~

light source unit comprises a field-sequential light source unit for sequentially irradiating light to an object so that an object image will be projected on said solid-state imaging device[[;]],

~~a sensitivity control means for varying a sensitivity control pulse, applying it to said solid-state imaging device, and thus controlling the electron multiplication rate for said solid-state imaging device; and~~

said a signal processing means unit including a signal pre-processing means for processing a signal output from said solid-state imaging device, a field-sequential signal synchronizing means for synchronizing field-sequential signal components output from said signal pre-processing means, and a signal post-processing means for processing an output signal of said synchronizing means to produce a television signal.

Claim 4 (Previously Presented): An endoscope system according to Claim 1, wherein said sensitivity control means is controlled based on any of a designation signal output from a designating means, an information signal fed from a connected endoscope and representing a feature of the endoscope, a movement information signal output from said light source unit, a signal representing a driving condition for said solid-state imaging device, and an output signal of said signal processing unit.

Claim 5 (Previously Presented): An endoscope system according to Claim 2, wherein said sensitivity control means extends control differently between observation in the ordinary light mode and observation in the special light mode.

Claim 6 (Previously Presented): An endoscope system according to Claim 1, wherein at least one of the number of pulses exhibited by a pulsating signal to be applied to said solid-state imaging device, and the waveform of the pulse is set for said sensitivity control means.

Claim 7 (Original): An endoscope system according to Claim 4, wherein the information representing a feature of a connected endoscope is at least one of an f-number for the

endoscope and the number of optical fibers constituting a light guide lying through the endoscope.

Claim 8 (Original): An endoscope system according to Claim 4, wherein the movement information concerning said light source unit is at least one of information based on an amount of light emitted from a lamp and information based on an iris diaphragm.

Claim 9 (Original): An endoscope system according to Claim 4, wherein the driving condition for said solid-state imaging device is at least one of information of an electronic shutter and information based on an imaging signal reading rate.

Claim 10 (Previously Amended): An endoscope system according to Claim 4, wherein the information representing a feature of a connected endoscope with which said sensitivity control means may be controlled is input at an input means.

Claim 11 (Previously Presented): An endoscope system according to Claim 1, wherein said signal processing unit includes a means that when an output signal of said solid-state imaging device is lower than a set voltage level, amplifies a gain to be given to the signal.

Claim 12 (Previously Presented): An endoscope system according to Claim 1, wherein said sensitivity control means is included in said signal processing unit, and the sensitivity of said solid-state imaging device is set based on a type of endoscope or a property of each solid-state imaging device.

Claim 13 (Previously Presented): An endoscope system according to Claim 1, wherein said light source unit includes a light level adjustment mechanism realized with an iris diaphragm.

Claim 14 (Previously Presented): An endoscope system according to Claim 2, wherein said light source unit field-sequentially irradiates light to an object, and an exposure time for observation in the special light mode is made longer than that for observation in the ordinary light mode.

Claim 15 (Previously Presented): An endoscope system according to Claim 2, wherein the observation in the special light mode is at least one of observation of auto-fluorescence, observation of fluorescence of a drug, observation of fluorescence induced with infrared light, and observation of reflected light of specified wavelengths.

Claim 16 (Previously Presented): An endoscope system according to Claim 2, wherein said light source unit emits light of wavelengths ranging from the ultraviolet spectrum to the blue spectrum for observation in the special light mode, and the light is at least one of light whose wavelengths fall within the ultraviolet spectrum, light whose wavelengths fall within the blue spectrum, light of specified wavelengths falling within the visible spectrum and exciting a drug used for photodynamic diagnosis, light of specified wavelengths ranging from the visible spectrum to the near-infrared spectrum, and light whose wavelengths are specified ones falling within the near infrared spectrum and which causes fluorescence.

Claim 17 (Previously Presented): An endoscope system according to Claim 1, wherein said endoscope is of a field-sequential type.

Claim 18 (Previously Presented): An endoscope system according to Claim 2, wherein said endoscope has two solid-state imaging devices incorporated in the distal part thereof, one of the two solid-state imaging devices is a solid-state imaging device not having an electron multiplication function but picking up an image signal from ordinary light, and the other one thereof is a solid-state imaging device having the electron multiplication function and picking up an image signal from special light.

Claim 19 (Previously Presented): An endoscope system according to Claim 2, wherein said endoscope has two solid-state imaging devices incorporated in the distal part thereof, one of the two solid-state imaging devices is a solid-state imaging device for picking up an image signal from ordinary light, and the other one thereof is a solid-state imaging device for picking up an image signal from special light.

Claim 20 (Previously Presented): An endoscope system according to Claim 1, wherein the solid-state imaging device comprises an electron multiplication mechanism in which impact ionization occurs due to the pulsating driving signals applied, and electrons produced under control of the number of pulses per unit time or amplitudes of the pulsating driving signals are multiplied to vary the sensitivity thereof.

Claim 21 (Previously Presented): An endoscope apparatus according to Claim 20, wherein the electron multiplication mechanism is provided at each pixel location or at an immediately preceding detection amplifier stage.

Claim 22 (Previously Presented): An endoscope apparatus according to Claim 1, wherein the solid-state imaging device comprises a first solid-state imaging device for detecting the object image in fluorescent light, and a second solid-state imaging device for detecting the object image in visible light.

Claim 23 -28 (Canceled).

Claim 29 (Currently Amended): An endoscope system ~~according to Claim 27, wherein the light source unit further includes comprising:~~

an endoscope having a solid-state imaging device to which a plurality of pulsating signals are applied and of which the sensitivity is varied by multiplying electrons produced;

a signal processing unit for processing an output signal from the solid-state imaging device;

a light source unit for irradiating light to an object so that an object image will be projected on the solid-state imaging device, said light source unit comprising an irradiation light switching device for switching object irradiation between ordinary light to perform observation under ordinary light and excitation light to perform observation under special light; and to irradiate the object,

a sensitivity control device for varying the pulsating signals, applying them to the solid-state imaging device during a reading period of the solid-state imaging device, and thus controlling the electron multiplication rate for the solid-state imaging device,

wherein the sensitivity control device renders the electron multiplication rate of the solid-state imaging device different according to whether the excitation light is irradiated to the object or whether ordinary light is irradiated to the object.

Claim 30. (Currently Amended) An endoscope system ~~according to Claim 28, wherein the filter member comprises comprising:~~

an endoscope having a solid-state imaging device to which a plurality of pulsating signals are applied and of which the sensitivity is varied by multiplying electrons produced;

a signal processing unit for processing an output signal from the solid-state imaging device;

a light source unit including a lamp for irradiating light to an object so that an object image will be projected on the solid-state imaging device;

a rotary filter member provided in an optical path between the object and the lamp and having a filter to transmit the light from the lamp to irradiate the object and interceptive areas to intercept the light from said lamp and, a mechanism for arranging the filter and the interceptive areas of the filter member in the optical path;

a rotary filter member provided in an optical path between the object and the lamp and having a first filter to transmit the light from said lamp to irradiate the ordinary light to the object, a second filter to irradiate the special light to the object, and interceptive areas to intercept the light from said lamp, and a mechanism for arranging the first and second filters and the interceptive areas of the filter member in the optical path; and a mechanism for arranging the filter member comprising

~~wherein the filter member comprises a rotary filter member having a first filter to transmit the light from said lamp to irradiate the ordinary light to the object, and a second filter to irradiate the special light to the object, said mechanism for arranging the filter member further comprising:~~

a motor to rotate the rotary filter member; and

a filter switching means for switching between the first filter and the second filter arranged in the optical path to switch between the ordinary light and the special light to be irradiated to the object~~[,]~~; and,

a sensitivity control device for varying the pulsating signals, applying them to the solid-state imaging device during a reading period of the solid-state imaging device, and thus controlling the electron multiplication rate for the solid-state imaging device,

wherein the sensitivity control device renders the electron multiplication rate of the solid-state imaging device different between the ordinary light and the special light.

Claim 31 (Previously Presented): An endoscope system according to Claim 30, wherein the sensitivity control device varies the pulsating signals such that the electron multiplication rate of the solid-state imaging device in the observation under special light when the special light is irradiated to the object is made larger than that in the observation under ordinary light when the ordinary light is irradiated to said object.

Claim 32 (Previously Presented): An endoscope system according to Claim 31, wherein the light source unit comprises:

an iris diaphragm which adjusts light level to the light irradiated to the object; and,

an iris diaphragm controller for controlling the iris diaphragm wherein the iris diaphragm controller controls the iris diaphragm such that the iris diaphragm is opened when the light irradiated to the object is switched by the filter switching means from the ordinary light to the special light.

Claim 33 (Previously Presented): An endoscope system comprising:

an endoscope having a solid-state imaging device to which a plurality of pulsating signals are applied and of which the sensitivity is varied by amplifying charge carriers produced;

a signal processing unit for processing an output signal from the solid-state imaging device;

a light source unit for irradiating light to an object, the light source unit includes a lamp for irradiating light to the object;

a filter member provided between the object and the lamp and having a first filter to transmit the light from the lamp to irradiate ordinary light to the object and a second filter to irradiate excitation light to the object;

a switching device for switching between the first filter and the second filter so as to selectively arrange the first filter and the second filter between the object and the lamp;

an iris diaphragm which adjusts light level of the light irradiated to the object and an iris diaphragm control device for controlling the iris diaphragm;

a mode switching device for switching between observation under ordinary light to irradiate ordinary light to the object by arranging the first filter between the object and the lamp and observation under special light to irradiate excitation light to the object by arranging the second filter between the object and the lamp; and

a sensitivity control device for varying at least the number of pulses or amplitudes of the pulsing signals to be applied to the solid-state imaging device so as to vary the sensitivity of the solid-state imaging device between the observation under ordinary light and the observation under special light,

wherein the iris diaphragm control device controls the iris diaphragm opening when the light irradiated to the object is switched by the filter switching mechanism from the ordinary light to the special light.